CLAIMS:

1. A method for producing of MR contrast agent, the method comprising the steps of:
-*obtaining* a solution in a solvent of a hydrogenatable, unsaturated substrate compound and a catalyst for the hydrogenation of a substrate compound, wherein the substrate compound comprises imaging nuclei;
-*hydrogenating* the substrate with hydrogen gas (H_2) enriched in para-hydrogen (p-$^1H_2$) to form a hydrogenated contrast agent;
-*exposing* the contrast agent to a sequence of pulses of magnetic field for enabling spin-order to be transferred from protons in the hydrogenated contrast agent to polarization of a nucleus within the same molecule for enhancing the contrasting effects of the contrast agent adapted for use in an MR application.

2. The method according to claim 1 **wherein** the exposing step comprises the steps of:
-*placing* (300) a dose or part of a dose of the contrast agent in a magnetic field treatment chamber (245) having a magnetic field in the order of the earth magnetic field;
-*subjecting* (305:1-305:N) the dose or part of a dose of the contrast agent to a first pulse of magnetic field having a first magnetic field strength, a first orientation and a first duration, and to one or more further subsequent pulses of magnetic field, wherein two subsequent pulses differ in at least one of the parameters: magnetic field strength, orientation or duration;
-*applying* (310) to the dose or part of a dose of the contrast agent a magnetic field of the same order of magnetic field strength and direction as said initial field.

3. The method according to claim 2 **wherein** the pulses of magnetic field are realized through the steps of:
-rapidly *increasing* the magnetic field in one orientation;
-*maintaining* the magnetic field at a constant level and orientation for a predetermined duration;
-rapidly *decreasing* the magnetic field.

4. The method according to claim 2 **wherein** the subsequent pulses of magnetic field follow essentially immediately after each other.

5. The method according to claim 3 **wherein** the magnetic field is increased from an essentially zero-field to a magnetic field with a field strength in the interval of 0.1-1 mT.

6. The method according to claim 3 **wherein** the duration of the constant magnetic field is in the interval of 1-100 ms.

7. A computer program product directly loadable into the internal memory of a processing means within a processing unit for controlling the method and apparatus for producing MR contrast agent, comprising the software code means adapted for controlling the steps of any of the claims 1 to 6.

8. A computer program product stored on a computer usable medium, comprising a readable program adapted for causing a processing means, in a processing unit for controlling the method and apparatus for producing MR contrast agent, to control an execution of the steps of any of the claims 1 to 6.

9. Apparatus for producing MR contrast agent, the apparatus comprising a magnetic treatment unit (240) adapted for magnetic treatment of the contrast agent, **characterised in** that the magnetic treatment unit (240) comprises means for producing pulses of magnetic field.

10. Apparatus according to claim 9 **wherein** said means for producing pulses of magnetic field comprises of orthogonal Helmholtz pairs.

11. Apparatus according to claim 9 **wherein** the magnetic treatment unit (240) further comprises means for detecting the induced magnetic signal of the contrast agent.

12. Apparatus according to claim 11 **wherein** the means for detecting the induced magnetic signal comprises pick-up coils in more than one direction.